



# Agilent Technologies

## Isolation Products

### Frequently Asked Questions

#### General Frequently Asked Questions

**1. What are the different types of Optocoupler product groups?**

Analog, Digital, Integrated Gate Drive, Isolation Amplifier, and Application Specific Optocouplers (ASOC)

**2. What are the different regulatory standards that apply to Agilent Technologies Optocouplers?**

UL 1577, CSA, BSI, and VDE 0884

**3. What are the main differences between UL, CSA, and VDE ratings?**

UL and CSA rate Optocouplers on the basis of their dielectric withstand voltage capability. The VDE ratings are based on a non-destructive insulation test.

**4. What are the different package types?**

DIP, S05, S08, S016, Widebody, and Hermetic

#### Analog Frequently Asked Questions

**1. What are the different categories of Analog Optocouplers?**

High linearity Optocouplers, High Bandwidth Optocouplers, and Motor Current Sense Optocouplers

**2. Which Optocoupler provides A/D conversion?**

The HCPL-7860 isolated modulator and the HCPL-7870 digital interface IC together form an isolated programmable two-chip A/D converter.

**3. Which Optocoupler is best suited for video signal coupling?**

The HCPL-4562 high bandwidth Optocoupler is optimized for video signal coupling.

**4. Which Optocoupler is best suited for high linearity analog applications?**

HCNR200 or the HCNR201

#### Digital Frequently Asked Questions

**1. What are the different data rates for the Digital Optocouplers?**

100 Kb/s, 1 Mb/s, 5 Mb/s, 10 Mb/s, 12.5 Mb/s, and 25 Mb/s

**2. Which Optocoupler can be used for Profibus or DeviceNet applications?**

HCPL-2400, HCPL-2600/2631, HCPL-x720/x721

**3. Which Optocoupler can I use for 20 mA current loop applications?**

Use the HCPL-4100 as a transmitter and the HCPL-4200 as the receiver.

**4. Which switching parameters decide the maximum data transfer rate?**

The three important parameters are maximum propagation delay, pulse width distortion, and channel distortion (propagation delay slew).



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**5. *Do I need a supply bypass capacitor for Darlington transistor output type Optocouplers?***

Yes, the Darlington output Optocouplers have a very high photodiode to output current gain. Therefore, bypassing is very important to ensure that noise on  $V_{CC}$  does not cause spurious switching. In parallel applications, an individual bypass capacitor must be used to ensure glitch-free operation.

**Current Sense Frequently Asked Questions**

**1. *What are the features required for a current sensing resistor?***

The current sensing resistor should have low resistance, low inductance, and reasonable tolerance. Choosing a particular value for the resistor is usually a compromise between minimizing power dissipation and maximizing accuracy.

**2. *What are the extra features available with HCPL-788J for current sensing?***

The HCPL-788J greatly simplifies current sense designs by providing an output voltage that can connect directly to an A/D converter. It has integrated short circuit and overload detection circuitry. The HCPL-788J has better linearity, offset vs. temperature, and Common Mode Rejection performance.

**3. *What happens if I don't use the 470 pF output capacitors in the recommended application circuit of the HCPL-788J?***

These capacitors reduce the narrow spikes caused by high common mode slew rates. If your application does not have rapid common mode voltage changes, these capacitors are not needed.

**Gate Drive Frequently Asked Questions**

**1. *What are the different Agilent Technologies Optocoupler product groups for motor drive applications?***

- Integrated Gate Drive Optocouplers for directly driving IGBTs
- Isolation Amplifier Optocouplers for motor current sense applications
- Intelligent Power Module (IPM) interface Optocouplers

**2. *What is the operating temperature range of Gate Drive Optocouplers?***

–40°C to 100°C. Refer to data sheets for detailed specifications.

**3. *What is the minimum CMR for Gate Drive Optocouplers?***

10 KV/ $\mu$ s at 1500 V peak transients

**4. *What are the special features available for Agilent Gate Drive Optocouplers?***

Fault feedback, over current protection, and under voltage lock out

**5. *What are the considerations taken into account for PCB layout?***

Adequate spacing should be maintained between the high voltage and low voltage sections. The placement and routing of supply bypass capacitors requires special attention. Ground plane connections are necessary in order to achieve maximum power dissipation.

**6. *What are the special features available for HCPL-316J?***

HCPL-316J has integrated fail safe IGBT protection, namely  $V_{CC}$  detection and under voltage lock out protection.

**7. *What are the electrical parameters taken into account to achieve the required dead time condition?***

The data sheet for Gate Drive Optocouplers has specific propagation delay and propagation delay between any two parts. The maximum dead time is equivalent to the difference between the maximum and minimum propagation delay specifications.

**8. *Why is a series gate resistor  $R_g$  required for driving the IGBT?***

The series gate resistor is required at the output to limit the peak output current below the absolute maximum ratings. The detailed calculation for determining the value of the gate resistor is explained in the data sheet.

**9. *What are the main differences between the IPM driver and the IGBT driver Optocouplers?***

IPM drivers have lower output power capability and have open collector output stage. IGBT drivers have higher output power capability and push pull output stage.



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